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7622 GUIDE FOR RESEEDING BURNED & LOGGED-
OVER PONDEROSA PINE LANDS
IN THE SOUTHWEST

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Reseeding protects the watershed and saves the soil for future timber and forage production

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X GUIDE FOR RESEEDING BURNED AND LOGGED-OVER

PONDEROSA PINE LANDS IN THE SOUTHWEST X

by

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WHY RESEED

More than 234,000 acres of southwestern ponderosa pine forests have been burned during the past 6 years, an average of over 39,000 acres per year. Fire not only destroys much timber and forage, but burning of protective plant and litter cover usually results in heavy soil erosion.

Severe damage is inflicted on burned forest watersheds which furnish the bulk of the water so vital to the welfare of the Southwest. Often livestock watering tanks and reservoirs are filled with silt, roads are covered, and drainage ditches plugged. Heavy soil losses also greatly reduce potential productivity of the burned-over areas.

Re seeding with adaptable species and methods provides a tool for establishing a quick cover to stabilize the soil. Moreover, siltation is decreased, and the site is protected for future timber production. Weeds are also kept out, and forage is increased, contributing to fuller land use while reforestation is being accomplished.

Logging disturbance, though limited to scattered spots, log roads, and skid trails, and accordingly less extensive and severe than fire damage, is serious on local areas. Baring and churning of the soil by logging operations often result in soil erosion with attendant site deterioration, watershed damage, and decreased production of both timber and forage. Recovery of desirable vegetation is often so slow that the disturbance from repeated operations persists over several decades. The area damaged by erosion may be larger than that actually denuded, since soil is often removed from disturbed upper slopes and deposited on undisturbed lower levels. Erosion also causes losses by damaging or destroying permanent roads and other improvements.

Artificial re seeding, when properly done, can be used on many logged areas to assist in stabilizing the soil and improving forage for domestic livestock and wildlife. It may be particularly useful in stabilizing spur roads that can be re-used in future timber harvesting operations.

^{1/}Maintained by the Forest Service, U. S. Department of Agriculture, for Arizona, New Mexico, and West Texas, with headquarters in Tucson, Arizona.



WHERE TO RESEED

PONDEROSA PINE BURNS

Recent pine burns where the herbaceous vegetation and litter have been destroyed by fire and a layer of loose ash left on the ground surface are excellent reseeding sites. Satisfactory reseeding can also be achieved readily on older burns as long as the ground is still relatively free from invading weeds, and a friable cover of ash and soil remains to provide a seedbed. Reseeding is more difficult on older weed-infested burns or where the ashes and loose surface soil have been eroded away or compacted. On such areas a good seedbed must be prepared for successful reseeding.

LOGGED-OVER LANDS

Reseeding is often quicker and more effective than natural revegetation for restoring a protective cover on logging roads, skid trails, landings, roadside strips mechanically cleared of slash by bulldozer, and other locations where the soil has been disturbed and the herbaceous cover largely destroyed by logging operations.

Reseeding will be ineffective where the ground has been only lightly disturbed by logging and where much of the native vegetation remains. Recovery of such areas is best achieved through natural revegetation aided by the use of drainage structures where needed to prevent erosion, and by protection against too heavy grazing.

WHAT SPECIES SHOULD BE SELECTED FOR RESEEDING

A wide range of plants is suitable for reseeding ponderosa-pine burns and logged areas (Table 1). These will all grow well under the moisture, temperature, and soil conditions generally found in the pine zone, and the decision of which to use for any specific planting depends on local growing conditions and especially on the purpose of the planting. Table 1 presents the important characteristics of the species adapted to the southwestern ponderosa-pine type. Species useful for any particular reseeding situation may be selected from the table. The following examples illustrate how suitable species may be selected.

The long-lived perennial grasses listed can be used to provide a permanent herbaceous cover on recurrently used logging roads, fire lanes, and drainage ways. On these areas where pines are not desired, sod-forming grasses, such as smooth brome and intermediate wheatgrass, will give maximum soil protection. The tall bunch grasses, such as tall wheatgrass, permit better survival of pine seedlings and yet provide an effective and persistent soil cover. Where only a temporary cover is desired to provide soil protection and to keep out undesirable weedy invaders until artificial reforestation can be accomplished, the annuals or short-lived perennials might be used.

Table 1.--Reseeding species adapted to the southwestern ponderosa pine

	:	:	:Value for
	:	:	: erosion
Adapted species	: Scientific name	:Vegetative:	control
	:	: form	: and soil
	:	:	:protection

Long-lived perennials

Big bluegrass	Poa ampla	Bunch grass	Fair
Bluestem wheatgrass	Agropyron smithi	Sod grass	Fair
Crested wheatgrass	A. cristatum	Bunch grass	Fair
Intermediate wheatgrass	A. intermedium	Sod grass	Good
Orchardgrass	Dactylis glomerata	Bunch grass	Good
Smooth brome	Bromus inermis	Sod grass	Fair
Tall wheatgrass	A. elongatum	Bunch grass	Good
Russian wildrye	Elymus junceus	Bunch grass	Fair

Short-lived perennials

Blue wildrye	Elymus glaucus	Bunch grass	Good
Canada wildrye	E. canadensis	Bunch grass	Good
Michel's hybrid rye	Secale cereale	Bunch grass	Fair
Mountain rye	S. montanum	Bunch grass	Fair
Mountain brome	Bromus carinatus	Bunch grass	Fair
Slender wheatgrass	Agropyron trachycaulum	Bunch grass	Good
Tall oatgrass	Arrhenatherum elatus	Bunch grass	Fair

Annuals

Black mustard	Brassica nigra	Single stem	Good
India mustard	B. juncea	Single stem	Fair
White mustard	B. hirta	Single stem	Fair

type: their characteristics and seeding rates

Initial : erosion : protection: value :	Vigor and : aggressive- ness :	Seed : resis- :tance :washing :	Palata- : to: bility :	Seed : purity: :	Seed : germina- tion :	Seeding : rate per : acre :
				(Pct.)	(Pct.)	(Lbs.)
Fair	Fair	Poor	Poor	85	72	6 - 8
Poor	Fair	Fair	Fair	92	65	10 - 15
Poor	Fair	Poor	Fair	88	86	5 - 8
Fair	Good	Good	Good	89	91	6 - 10
Fair	Good	Fair	Good	86	82	4 - 8
Fair	Fair	Poor	Good	93	88	8 - 12
Fair	Good	Good	Fair	92	90	8 - 12
Poor	Fair	Fair	Fair	91	82	6 - 8
Fair	Good	Fair	Fair	96	88	8 - 10
Fair	Good	Fair	Fair	95	90	10 - 12
Fair	Fair	Good	Fair	97	78	15 - 20
Fair	Fair	Good	Fair	-	-	10 - 15
Fair	Fair	Poor	Fair	98	89	10 - 15
Fair	Good	Good	Fair	93	93	8 - 10
Fair	Fair	Poor	Fair	85	80	10 - 12
Good	Good	Good	None	97	85	5 - 6
Good	Good	Good	None	97	85	5 - 6
Good	Fair	Good	None	95	90	5 - 6



On critical areas where erosion control is the primary purpose of the planting, species selected should produce either a dense ground cover, a large volume of herbage, or better still, a good combination of both. Outstanding in this respect are intermediate wheatgrass, orchardgrass, and tall wheatgrass among the long-lived perennials; slender wheatgrass, blue wildrye, and Canada wildrye among the short-lived perennials; and black mustard among the annuals.

On steep slopes or easily eroded soils, quick initial protection is especially important. Annual mustards start growth most rapidly and give the best initial protection but die out at the end of the first growing season. Perennial grasses start off more slowly but give the best soil protection after the first year.

For reseeding old burns or lightly disturbed areas where seedbeds are unfavorable, weedy plants abundant, and seed coverage impossible, species which are vigorous enough to become established under adverse conditions and aggressive enough to resist or overcome competition should be chosen. These requirements are best met by intermediate, tall, and slender wheatgrass, orchardgrass, blue and Canada wildrye, among the perennials, and black and India mustard among the annuals.

Light, chaffy, or trashy seed broadcast on the soil surface is easily floated off and washed away by runoff water. In areas of very steep, smooth slopes, where torrential rains are common, species with clean heavy seed which tends to resist washing may be used. Intermediate, tall, and slender wheatgrass, and the mustards, are recommended.

Grasses that yield large amounts of palatable forage for reseeding burned and logged portions of forest ranges can appreciably improve their grazing value. Intermediate wheatgrass, orchardgrass, and smooth brome are especially suitable. For successful establishment of such palatable species it is necessary to keep livestock from the reseeded areas for one to two years after planting. Where it is impractical to fence or otherwise provide adequate protection, less palatable species, such as big bluegrass and the mustards, can be used.

HOW TO RESEED

USE PROPER PLANTING METHODS

Successful reseeding depends to a large degree on good planting techniques. This is so important that a single phase of the operations may often spell the difference between success and failure.

Methods for Reseeding Burns

On many burns summer rains soon after the fire result in soil washing, compaction, and establishment of many undesirable weeds. These changes destroy the loose, competition-free seedbed and decrease the chances for reseeding success. For best results, therefore, seed should be planted in the loose ash before the first heavy summer rains occur (fig. 1).



L-283, L-134

Figure 1.--Burns should be reseeded as soon after the fire as possible to avoid weed competition. A, An untreated burn showing natural revegetation by undesirable weedy plants. B, A similar burn which was broadcast seeded to slender wheatgrass immediately after the fire.

Broadcasting, with no mechanical covering, is satisfactory for seeding recent burns since the settling of the loose ash usually covers the seed adequately. It is also suitable for older burns if the ground is still free from weeds and enough friable soil and ash remain to furnish a good seedbed.

On crusted or compacted soils mechanical coverage must be provided to protect the seed against harmful moisture and temperature fluctuations. This is so costly with present available hand-labor methods that its use is limited to areas where a vegetative cover is essential for the protection of agricultural lands and expensive improvements such as reservoirs, buildings, roads, power lines, and pipe lines.

Methods for Reseeding Logged-over Lands

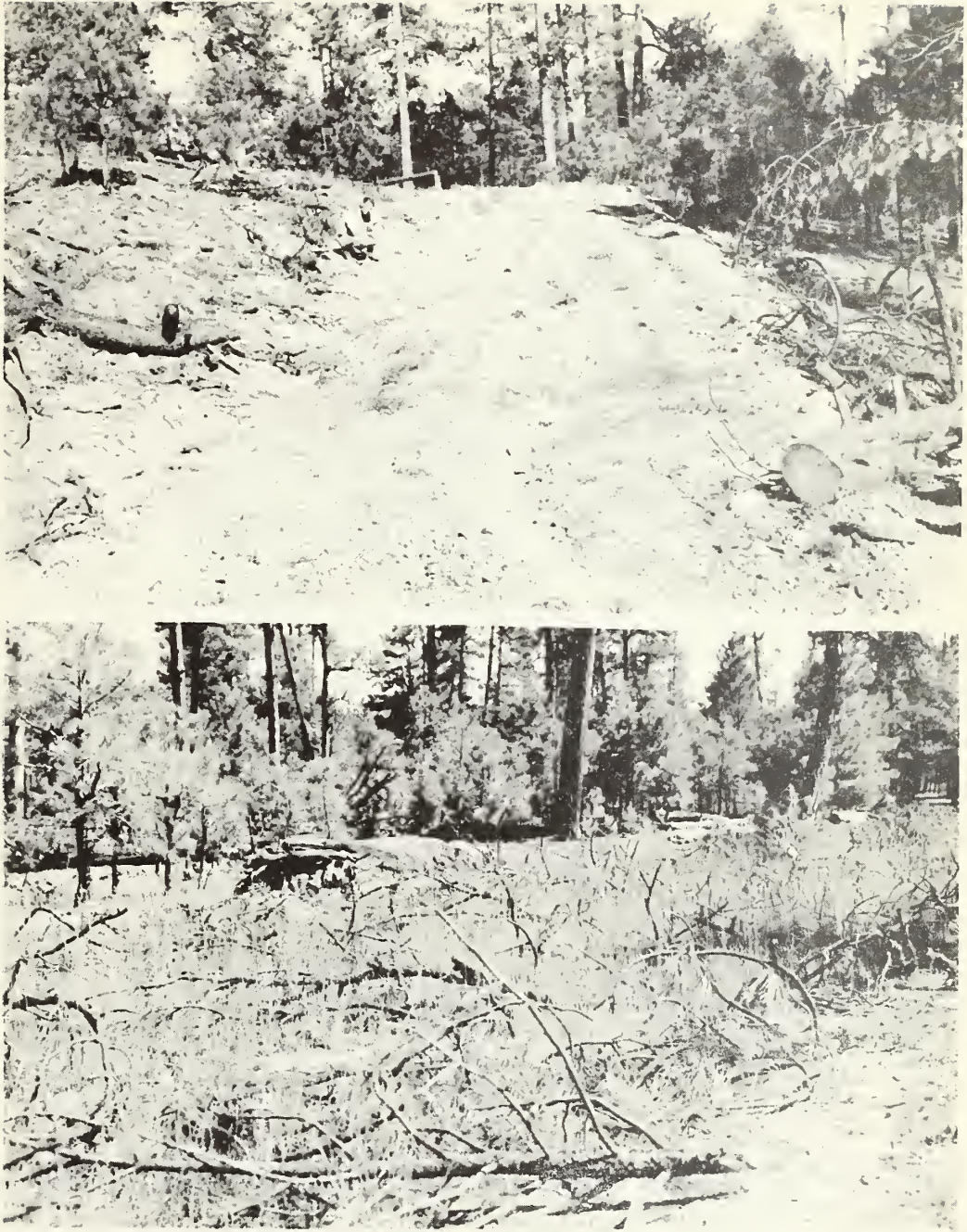
Logged-over lands can usually be reseeded successfully by broadcasting alone if the soil surface is loose at time of planting. On sites which have been compacted by heavy equipment, settling, or washing, however, cultural treatment to loosen the soil surface is necessary. At present, reseeded on the compacted soils of logged-over lands is limited because practical tillage equipment is lacking. The ordinary light farm equipment, such as harrows, disks, and drills, is poorly suited for the steep, rough, logged areas.

Slash cleanup by bulldozer often disturbs the ground and greatly favors reseeded. It is usually best to wait until cleanup work has been completed before planting. Areas in need of reseeded can then be more easily recognized and adequately seeded by spot broadcasting. Also, less seed will be wasted on undisturbed ground or destroyed by burying or burning during the slash-disposal operations.

Erosion can be effectively controlled on the steeper logging roads and skid trails by broadcasting seed and then covering with slash (fig. 2). In the beginning, the slash cover is more effective than the planting for checking erosion. As the slash gradually deteriorates, the plants become well established and assume the major role in stabilizing the soil.

Since hand broadcasting is both slow and difficult, it is usually best to use some type of mechanical broadcaster. Small hand-operated broadcasters are well suited for many situations such as spot seeding small burns and scattered areas disturbed by logging. Where tillage is necessary it can be combined with broadcasting by using a seeder-box-type broadcaster mounted either on the tractor or the tillage implement. On large burns, airplane broadcasting may be most efficient. For example, on one large pine burn each man of a crew using hand broadcasters planted an average of 8 acres per day while with favorable weather an airplane planted 1,000 acres per day. The greater planting speed obtained by plane is valuable in reseeded fresh burns because of the short time usually available before summer rains begin.





L-235, L-148

Figure 2.--Erosion can be effectively controlled on logging roads by broadcasting seed and then covering with slash. A, An untreated logging road two years after abandonment showing severe erosion. B, A similar abandoned road, seeded and covered with slash, showing a one-year-old stand of big bluegrass.



Drilling with a single-disk grain drill is a good method for reseeding compacted soils where the terrain is not too steep, rough, rocky, or trashy. When drilling is used on abandoned logging roads, or skid trails, however, the creation of drill furrows running parallel with the road or trail is somewhat objectionable.

Where seed is covered, it must be planted at the right depth. This varies from 1/4 to 1 inch depending mainly on the size of the seed. Small seed must be planted very shallow, whereas larger seed can be planted deeper. Seed can be planted deeper on sandy soils than on heavy clay soils or those that crust readily.

USE PROPER SEEDING RATES

Rate of seeding required for successful planting varies with quality of seed, nature of seedbed, planting method, and characteristics of the species used such as seed size, seedling vigor, and growth form. Seeding rates based on average purity and germination of good seed lots are given in Table 1. With seed that differs in purity and germination from the standards given, rates must be adjusted accordingly.

The minimum seeding rate given for each species is adequate for use on good seedbeds, or with an intensive planting method such as drilling where each individual seed has a good chance to become a mature plant. With planting methods which provide less control over seed distribution, rate, or depth of planting, and on poorer seedbeds, the higher seeding rate should be used.

PLANT AT THE RIGHT TIME

Burns

The reseeded stand is most easily damaged by drought during initial stages of germination and establishment. For best results, therefore, planting must be timed so that the seedlings can make maximum growth during favorable moisture periods and before the first dry season.

Forest fires normally occur during the dry spring period of April, May, and June. Ideally, these fresh burns should be seeded just before the first hard summer rains. Seed planted earlier may germinate following light spring showers but the seedlings will die before the summer rains begin. Plantings made after the beginning of summer rains encounter increased weed competition and soil compaction which lessen chances for success. The best planting period, on the average, is between June 15 and July 1 (fig. 3). Older burns still suitable for reseeding are subject to the same conditions as fresh burns and should be planted during the same period.



Logged-Over Areas

Logging activities are mainly carried on from the time the ground is dry in the early spring until heavy snowfall in the winter. The best time for planting any particular disturbed area will, therefore, depend on the schedule of logging and cleanup work, but the aim should be to seed as much as possible when chances for success without cultural treatment are greatest. Thus spring disturbances should be seeded just before the summer rains (June 15 to July 1) to provide both favorable moisture conditions and a loose seedbed. Summer disturbances (July 1 to August 15) should be seeded currently, as soon as possible after they occur. In this way the necessity for tillage because of soil compaction can usually be avoided. In locations where dependable, heavy snowfall occurs, fall plantings (after September 15) can be carried on in the same manner as for the summer. On compacted sites where loosening of the soil surface is required, seeding should be done concurrently with tillage in the period between June 15 and August 15.

GRAZING MANAGEMENT NEEDED AFTER RESEEDING

While many plantings on burns and logged areas do well without special protection from livestock, some are severely damaged or even destroyed by excessive grazing and trampling. Where possible, therefore, at least partial protection should be provided for new plantings during the first two years. This enables plants to develop enough root and top growth to better withstand grazing, drought, cold, disease, and other adverse conditions. Established stands should be grazed conservatively to maintain plant vigor, herbage yield, and ground cover density.

Reseeded stands on sheep ranges can be managed by herding. On cattle ranges, however, measures such as salting away from the reseeded areas, riding, and changing the place where the cattle are turned in to the range are necessary. Small scattered reseeded spots on logged-over lands can sometimes be initially protected by covering with slash. Large reseeded areas can often be best and most easily protected and managed by fencing.



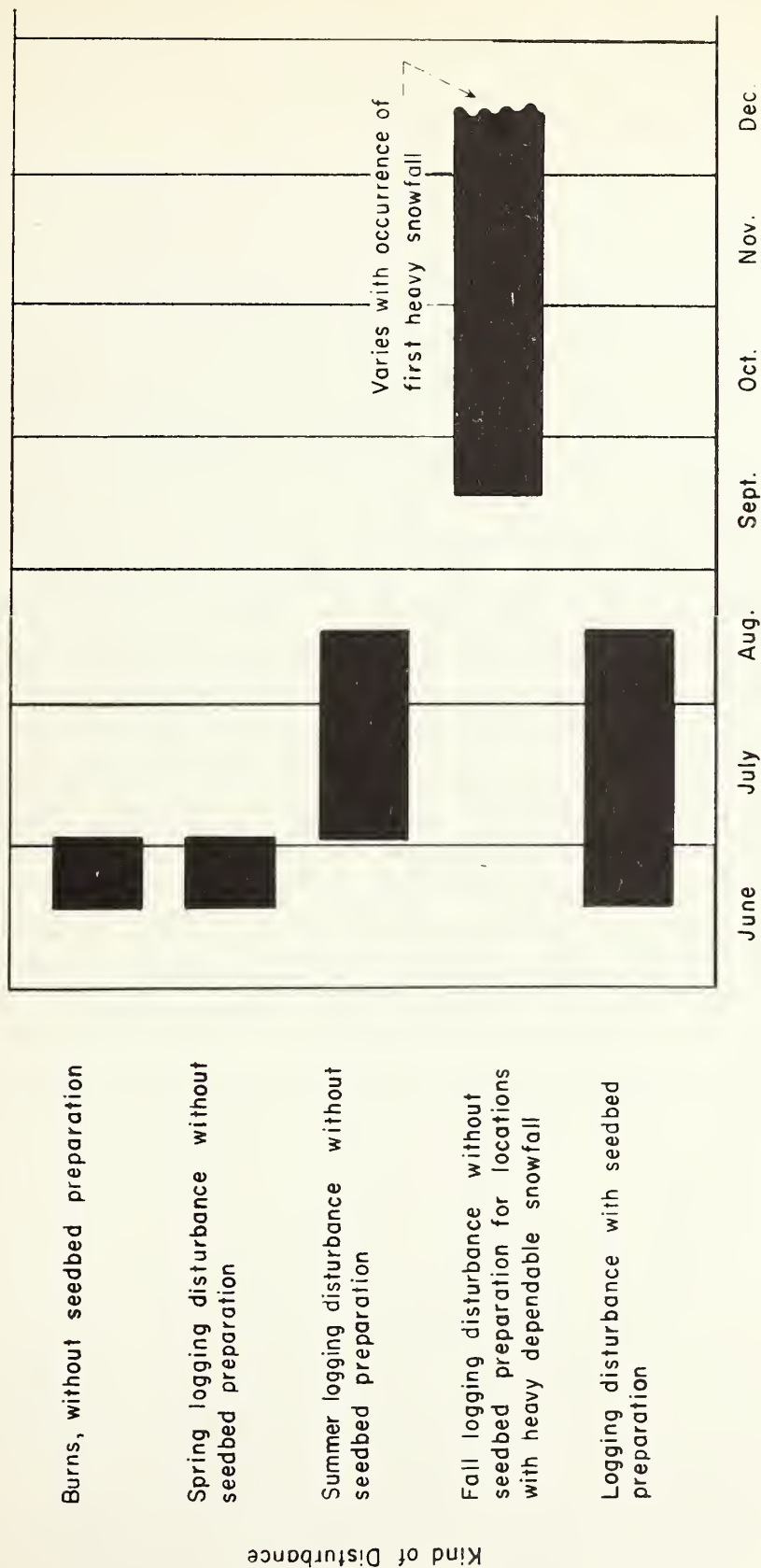


Figure 3. Planting periods for pine burns and logged-over lands.





